may not exceed 25 percent of the U.S. directed production volume.

(4) Manufacturers certifying engines to a voluntary NO_X standard of 0.10 g/bhp-hr (without using credits) in addition to all of the other applicable standards listed in paragraphs (a) and (c) of this section prior to model year 2007 may reduce the number of engines that are required to meet the standards listed in paragraph (a)(1) of this section in model year 2007, 2008 and/or 2009, taking into account the phase-in option provided in paragraph (g)(1) of this section. For every engine that is certified early under this provision, the manufacturer may reduce the number of engines that are required by paragraph (g)(1) of this section to meet the standards listed in paragraph (a)(1) of this section by two engines.

(5) For engines certified under paragraph (g)(1) of this section to the NO_X+NMHC standard in §86.004–11, the standards or FELs to which they are certified shall be used for the purposes of paragraphs (a)(3) and (a)(4) of this section.

(6) Manufacturers may determine the number of engines and vehicles that are required to certify to the NO_X standard in this section (including the phase-out engines certified to the NO_X+NMHC standard referenced in this paragraph (g)) based on calendar years 2007, 2008, and 2009, rather than model years 2007, 2008, and 2009.

(h)(1) For model years prior to 2012, for purposes of determining compliance after title or custody has transferred to the ultimate purchaser, for engines having a NO_X FEL no higher than 1.30 g/bhp-hr, the applicable compliance limit shall be determined by adding the applicable adjustment from paragraph (h)(2) of this section to the otherwise applicable standard or FEL for NO_X.

(2)(i) For engines with 110,000 or fewer miles, the adjustment is 0.10 g/bhp-hr.

(ii) For engines with 110,001 to 185,000 miles, the adjustment is 0.15 g/bhp-hr.

(iii) For engines with 185,001 or more miles, the adjustment is 0.20 g/bhp-hr.

(3) For model years prior to 2012, for purposes of determining compliance after title or custody has transferred to the ultimate purchaser, the applicable compliance limit shall be determined by adding 0.01 g/bhp-hr to the otherwise applicable standard or FEL for PM.

[65 FR 59954, Oct. 6, 2000, as amended at 66 FR 5161, Jan. 18, 2001; 70 FR 34619, June 14, 2005; 70 FR 40432, July 13, 2005; 71 FR 51486, Aug. 30, 2006; 73 FR 37192, June 30, 2008]

§86.007–15 NO_X and particulate averaging, trading, and banking for heavy-duty engines.

Section 86.007–15 includes text that specifies requirements that differ from §86.004–15. Where a paragraph in §86.004–15 is identical and applicable to §86.007–15, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see §86.004–15.''

(a)–(l) [Reserved]. For guidance see §86.004–15.

(m) The following provisions apply for model year 2007 and later engines (including engines certified during years 2007–2009 under the phase-in provisions of §86.007–11(g)(1), §86.005–10(a), or §86.008–10(f)(1)). These provisions apply instead of the provisions of paragraphs §86.004–15 (a) through (k) to the extent that they are in conflict.

(1) Manufacturers of Otto-cycle engines may participate in an NMHC averaging, banking and trading program to show compliance with the standards specified in §86.008–10. The generation and use of NMHC credits are subject to the same provisions in paragraphs §86.004–15 (a) through (k) that apply for NO_X plus NMHC credits, except as otherwise specified in this section.

(2) Credits are calculated as NO_X or NMHC credits for engines certified to separate NO_X and NMHC standards. NO_X plus NMHC credits (including banked credits and credits that are generated during years 2007–2009 under the phase-in provisions of §86.007–11(g)(1), §86.005–10(a), or §86.008–10(f)(1)) may be used to show compliance with 2007 or later NO_X standards (NO_X or NMHC standards for Otto-cycle engines), subject to an 0.8 discount factor (e.g., 100 grams of NO_X plus NMHC credits is equivalent to 80 grams of NO_X credits).

(3) NO_X or NMHC (or NO_X plus NMHC) credits may be exchanged between heavy-duty Otto-cycle engine families certified to the engine standards of this

subpart and heavy-duty Otto-cycle engine families certified to the chassis standards of subpart S of this part, subject to an 0.8 discount factor (e.g., 100 grams of NO_X (or NO_X plus NMHC) credits generated from engines would be equivalent to 80 grams of NO_X credits if they are used in the vehicle program of subpart S, and vice versa).

(4) Credits that were previously discounted when they were banked according to paragraph (c) of § 86.004–15, are subject to an additional discount factor of 0.888 instead of the 0.8 discount factor otherwise required by paragraph (m)(2) or (m)(3) of this section. This results in a total discount factor of 0.8 ($0.9 \times 0.888 = 0.8$).

(5) For diesel engine families, the combined number of engines certified to FELs higher than 0.50 g/bhp-hr using banked NO_X (and/or NO_X plus NMHC) credits in any given model year may not exceed 10 percent of the manufacturer's U.S.-directed production of engines in all heavy-duty diesel engine families for that model year.

(6) The FEL must be expressed to the same number of decimal places as the standard (generally, one-hundredth of a gram per brake horsepower-hour). For engines certified to standards expressed only one-tenth of a gram per brake horsepower-hour, if the FEL is below 1.0, then add a zero to the standard in the second decimal place and express the FEL to nearest one-hundredth of a gram per brake horsepower-hour.

(7) Credits are to be rounded to the nearest one-hundredth of a Megagram using ASTM E29–93a (Incorporated by reference at § 86.1).

(8) Credits generated for 2007 and later model year diesel engine families, or generated for 2008 and later model year Otto-cycle engine families are not discounted (except as specified in paragraph (m)(2) or (m)(3) of this section), and do not expire.

(9) For the purpose of using or generating credits during a phase-in of new standards, a manufacturer may elect to split an engine family into two subfamilies (e.g., one which uses credits and one which generates credits). The manufacturer must indicate in the application for certification that the engine family is to be split, and may assign the numbers and configurations of engines within the respective subfamilies at any time prior to the submission of the end-of-year report required by § 86.001–23.

(i) Manufacturers certifying a split diesel engine family to both the Phase 1 and Phase 2 standards with equally sized subfamilies may exclude the engines within that split family from end-of-year NO_X (or NO_X+NMHC) ABT calculations, provided that neither subfamily generates credits for use by other engine families, or uses banked credits, or uses averaging credits from other engine families. All of the engines in that split family must be excluded from the phase-in calculations of § 86.007–11(g)(1) (both from the number of engines complying with the standards being phased-in and from the total number of U.S.-directed production engines.)

(ii) Manufacturers certifying a split Otto-cycle engine family to both the Phase 1 and Phase 2 standards with equally sized subfamilies may exclude the engines within that split family from end-of-year NO_X (or NO_X+NMHC) ABT calculations, provided that neither subfamily generates credits for use by other engine families, or uses banked credits, or uses averaging credits from other engine families. All of the engines in that split family must be excluded from the phase-in calculations of § 86.008–10(f)(1) (both from the number of engines complying with the standards being phased-in and from the total number of U.S.-directed production engines.)

(iii) Manufacturers certifying a split engine family may label all of the engines within that family with a single NO_X or NO_X+NMHC FEL. The FEL on the label will apply for all SEA or other compliance testing.

(iv) Notwithstanding the provisions of paragraph (m)(9)(iii) of this section, for split families, the NO_X FEL shall be used to determine applicability of the provisions of §§ 86.007–11(a)(3)(ii), (a)(4)(i)(B), and (h)(1), and 86.008–10(g).

(10) For model years 2007 through 2009, to be consistent with the phase-in provisions of § 86.007–11(g)(1), credits generated from engines in one diesel engine service class (e.g., light-heavy duty diesel engines) may be used for

averaging by engines in a different diesel engine service class, provided the credits are calculated for both engine families using the conversion factor and useful life of the engine family using the credits, and the engine family using the credits is certified to the standards listed in § 86.007–11(a)(1). Banked or traded credits may not be used by any engine family in a different service class than the service class of the engine family generating the credits.

[66 FR 5163, Jan. 18, 2001]

§ 86.007–17 On-board Diagnostics for engines used in applications less than or equal to 14,000 pounds GVWR.

(a) *General.* (1) All heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less must be equipped with an on-board diagnostic (OBD) system capable of monitoring all emission-related engine systems or components during the applicable useful life. Heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less must meet the OBD requirements of this section according to the phase-in schedule in paragraph (k) of this section. All monitored systems and components must be evaluated periodically, but no less frequently than once per applicable certification test cycle as defined in appendix I, paragraph (f), of this part, or similar trip as approved by the Administrator.

(2) An OBD system demonstrated to fully meet the requirements in § 86.1806–05 may be used to meet the requirements of this section, provided that the Administrator finds that a manufacturer's decision to use the flexibility in this paragraph (a)(2) is based on good engineering judgment.

(b) *Malfunction descriptions.* The OBD system must detect and identify malfunctions in all monitored emission-related engine systems or components according to the following malfunction definitions as measured and calculated in accordance with test procedures set forth in subpart N of this part (engine-based test procedures) excluding the test procedure referred to as the ''Supplemental emission test; test cycle and procedures'' contained in § 86.1360, and excluding the test procedure referred to as the ''Not-To-Exceed Test Procedure'' contained in § 86.1370, and excluding the test procedure referred to as the ''Load Response Test'' contained in § 86.1380.

(1) *Catalysts and particulate filters*—(i) *Otto-cycle.* Catalyst deterioration or malfunction before it results in an increase in NMHC (or NO_X+NMHC, as applicable) emissions 1.5 times the NMHC (or NO_X+NMHC, as applicable) standard or family emission limit (FEL), as compared to the NMHC (or NO_X+NMHC, as applicable) emission level measured using a representative 4000 mile catalyst system.

(ii) *Diesel.* (A) If equipped, reduction catalyst deterioration or malfunction before it results in exhaust NO_X emissions exceeding, for model years 2007 through 2012, either 1.75 times the applicable NO_X standard for engines certified to a NO_X family emission limit (FEL) greater than 0.50 g/bhp-hr, or the applicable NO_X FEL+0.6 g/bhp-hr for engines certified to a NO_X FEL less than or equal to 0.50 g/bhp-hr and, for model years 2013 and later, the applicable NO_X FEL+0.3 g/bhp-hr. If equipped, diesel oxidation catalyst (DOC) deterioration or malfunction before it results in exhaust NMHC emissions exceeding, for model years 2010 through 2012, 2.5 times the applicable NMHC standard and, for model years 2013 and later, 2 times the applicable NMHC standard. These catalyst monitoring requirements need not be done if the manufacturer can demonstrate that deterioration or malfunction of the system will not result in exceedance of the threshold. As an alternative, oxidation catalyst deterioration or malfunction before it results in an inability to achieve a temperature rise of 100 degrees C, or to reach the necessary diesel particulate filter (DPF) regeneration temperature, within 60 seconds of initiating an active DPF regeneration. Further, oxidation catalyst deterioration or malfunction when the DOC is unable to sustain the necessary regeneration temperature for the duration of the regeneration event. The OBD or control system must abort the regeneration if the regeneration temperature has not been reached within five